

CLAIMS

Sub B-17
1. A pair of parent plants for producing seeds comprising:

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(i) a first parent plant containing one or more gene sequences encoding a polypeptide or protein A; and

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(ii) a second parent plant containing one or more gene sequences encoding a polypeptide or protein B;

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wherein the polypeptides A, B, when expressed in separate plants, do not form an active enzyme, a regulatory protein or protein which affects the functionality and/or viability and/or the structural integrity of a cell, but when expressed in the same plant do form an active enzyme, regulatory protein, or protein which affects the structural integrity of a cell.

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2. A pair of plants as claimed in claim 1 wherein the one or more gene sequences from at least one of the parents is transgenic.

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3. A pair of plants as claimed in claim 1 ~~or claim 2~~ wherein the polypeptides or proteins A, B, when expressed in the same plant, cause cell ablation, especially male-sterility or embryoless seeds.

4. A pair of plants as claimed in ~~any one of claims 1 to 3~~ wherein one of the parent plants is male-sterile.

5. A pair of plants as claimed in ~~any one of claims 2~~

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to 4 wherein the one or more gene sequences encoding both or one of the polypeptides or proteins A, B, is operatively linked to a tissue specific promoter.

5 6. A pair of plants as claimed in ~~any one of claims 1 to 5~~ wherein the polypeptides A, B are naturally occurring subunits of the protein complex of an active enzyme, regulatory protein, or protein which affects the structural integrity of a cell.

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D 7. A pair of plants as claimed in claim 6 wherein the polypeptides A, B are two polypeptide subunits of an enzyme having RNase activity such as the enzyme Barnase or RNase A or the monomers of the protein complex of the
15 Apelata3-pistillata.

8. A pair of plants as claimed in ~~any one of claims 1 to 5~~ wherein the polypeptides A, B are artificially split polypeptides of an active enzyme, regulatory
20 protein or protein which affects the structural integrity of a cell.

A A C
9. A pair of plants as claimed in ~~any one of the preceding claims~~ wherein each parent plant is homozygous
25 with respect to the one or more gene sequences encoding polypeptide A or B respectively.

A A
10. A pair of plants as claimed in ~~any one of claims 3 to 9~~ wherein the cause of male-sterility is direct or
30 indirect.

A A
11. A pair of plants as claimed in ~~any one of claims 5 to 10~~ wherein the tissue-specific promoter is a tapetum-specific promoter, an embryo-specific promoter or a seed

specific promoter.

12. A pair of plants as claimed in ~~any one of claims 1 to 11~~ wherein one or both of the polypeptides or proteins is fused to a carrier protein and/or a protein targeting signal.

13. A pair of plants as claimed in ~~any one of claims 1 to 12~~ wherein each polypeptide or protein A, B is linked to a protein dimerisation domain of a dimeric or multimeric protein sequence that promotes association of between subunits A and B.

14. A pair of plants as claimed in ~~any one of the preceding claims~~ wherein the one or more gene sequences from at least one of the parent plants is a heterologous gene sequence.

15. A method for producing a plant having a desired phenotype by virtue of an active enzyme, a regulatory protein or a protein which affects the structural integrity of a cell, the method comprising crossing a first line with a second line wherein the first line contains one or more gene sequences encoding a polypeptide or protein but which line does not have the desired phenotype and wherein the second line contains one or more gene sequences encoding a polypeptide or protein B which is complementary to the polypeptide or protein A but which line does not have the desired phenotype.

16. A method as claimed in claim 15 wherein the one or more gene sequences from at least one of the lines is transgenic.

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17. A method as claimed in claim 15 or ~~claim 16~~ wherein desired phenotype is cell ablation especially male-sterility or embryoless seeds.

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18. A method as claimed in ~~any one of claims~~ 15 to ~~17~~ wherein one of the lines is male-sterile.

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19. A method as claimed in ~~any one of claims~~ 15 to ~~18~~ wherein the one or more gene sequences encoding polypeptides or protein A and/or B is operatively linked to a tissue-specific promoter.

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20. A method as claimed in ~~any one of claims~~ 15 to ~~19~~ wherein the polypeptides or proteins A, B are naturally occurring subunits of an active enzyme, regulatory protein or protein which affects the structural integrity of a cell.

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21. A method as claimed in claim 20 wherein the polypeptides or proteins A, B are two polypeptide subunits of an enzyme having RNase activity such as the enzyme Barnase, RNase A or the subunits of the protein Apelata3-pistillata.

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22. A method as claimed in ~~any one of claims~~ 15 to ~~19~~ wherein the polypeptides or proteins A, B are artificially split polypeptides of an active enzyme, regulatory protein or protein which affects the structural integrity of a cell.

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23. A method as claimed in ~~any one of claims~~ 15 to ~~22~~ wherein each line is homozygous with respect to the gene sequence encoding polypeptide or protein A, B.

respectively.

A 24. A method as claimed in ~~any one of claims 15 to 23~~
wherein the desired phenotypic trait is direct or
5 indirect male-sterility.

A 25. A method as claimed in ~~any one of the claims 15 to~~
24 wherein the tissue-specific promoter is a tapetum-
specific promoter, an embryo-specific promoter or a seed
10 specific promoter.

A 26. A method as claimed in ~~any one of claims 15 to 25~~
wherein one or both of the polypeptides or proteins A, B
is fused to a carrier protein and/or a protein targeting
15 signal.

A 27. A method as claimed in ~~any one of claims 15 to 26~~
wherein each polypeptide or protein A, B is linked to a
different protein dimerisation domain of a dimeric or
20 multimeric protein.

A 28. A method as claimed in ~~any one of claims 15 to 27~~
wherein at least one of the lines contains, as the one
or more gene sequences, heterologous gene sequences.
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A 29. A seed or plant obtainable from a pair of plants as
claimed in ^{claim 1} ~~any one of claims 1 to 14 or by a method as~~
~~claimed in any one of claims 15 to 28.~~

30 30. A seed or plant, having a phenotype of an active
enzyme, regulatory protein or protein which affects the
integrity of a cell, which is caused by the combined
action of two or more transgenes, not present on the
same copy of a chromosome.

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C3

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1/3

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F11